IVth World Congress on National Parks and Protected Areas Caracas, Venezuela, February 1992

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INTRODUCTION

Held only once each decade, the IUCN, the World Conservation Union's World Congress on National Parks and Protected Areas was convened in Caracas, Venezuela on February 10–21, 1992. This was the fourth such congress. It provides a once-a-decade glimpse at the progress, problems and priorities of the global national parks and protected area movement, a benchmark for comparative assessments and a vital forum for establishing and renewing networks for practitioners, stakeholders and observers. The Fourth Congress provided a precursor to the United Nations Conference on Environment and Development (UNCED) held in June 1992 in Rio de Janeiro, Brazil, itself held 20 years after the pathfinding UN Conference on the Human Environment held in Stockholm in June, 1972.

This review can hardly do justice to the Congress with its over 1 500 participants, five plenary sessions, four symposia and 49 workshops held in 15 simultaneous strands. While most plenary and symposia papers were available in advance only scant abstracts of workshop papers appeared and the first of many formal publications proposed to emerge from the Congress is yet to appear. As such this review is but a foretaste and a preliminary assessment.

PREVIOUS PARKS CONGRESSES

The first congress, formally entitled the First World Conference on National Parks, originated from a suggestion made in 1958 at the IUCN General Assembly. The First World Conference on National Parks was held in Seattle, USA, in June and July, 1962. It was attended by 262 delegates from 63 countries, including 117 from the USA and five from Australia. Its stated aim was as follows: "The purpose of the meeting was to establish more effective international understanding and to encourage the national park movement on a worldwide basis" (Adams 1964). The second congress was held in 1972 in Yellowstone National Park, USA, as part of the centennial celebrations for the world's first national park. The third congress was held in October 1982 at Bali, Indonesia attended by 357 persons. Each of these three congresses resulted in major publications providing a substantive basis for professional national park management (Adams 1964; Elliot 1974; McNeely and Miller 1984).

The preliminary description for the IVth Congress outlined the contributions of the first two congresses: "The first two World Conferences on National Parks (in 1962 and 1972) helped to lay the foundations for international efforts in this field, setting standards for the selection, establishment and management of national parks, improving information about such areas, enhancing the professionalism of those involved in their planning and management, and strengthening the network of experts involved in parks." The contribution of the third congress was outlined in the report of the World Commission on Environment and Development (the Brundtland Report) as follows: "The Bali Congress demonstrated the many contributions that protected areas, managed in the modern way, are making to sustaining human society." (World Commission on Environment and Development, 1987).

The Bali Congress marked a significant change of emphasis from the previous two congresses:

- A shift of focus away from the North American models for national park management, and an increasing recognition that different models were required in countries with different cultural, economic and historical relationships with nature.
- A recognition of the broader roles of protected areas in society reflecting the philosophy of the World Conservation Strategy published in 1980 of an interdependence of environment and development in creating a sustainable future.

CARACAS CONGRESS PLANNING

The changes signalled at the Bali Congress were sought to be given greater emphasis at the Caracas Congress. Thus the Caracas Congress had as its theme "Parks for Life: Enhancing the Role of Protected Areas in

Sustaining Society" and the preliminary congress description for Caracas stated: "As a contribution to a more productive future for the planet, the IVth World Congress on National Parks and Protected Areas will help ensure that representative samples of the world's natural habitats are effectively managed for the sustainable benefit of both people and nature. This specific contribution from the Congress must be integrated with wider programmes designed to achieve global harmony between humanity and the natural world. These include Caring for the Earth, the Biodiversity Action Plan, and Agenda 21 (the result of the United Nations Conference on Environment and Development). . . . While the three previous congresses primarily involved the professionals directly concerned with protected areas, the IVth Congress also aims to reach out to and influence the numerous other sectors with links to protected areas. These include those who depend upon the genes, species, and ecosystem services provided by protected habitats (indigenous people, agriculture, forestry, fisheries, pharmaceutical and other interests) as well as those who require wildlands for other purposes (water, timber, wilderness, tourism, etc.). . . . numerous donor agencies have been invited to participate. A major effort is being made to involve the private sector as well, including non-governmental conservation organisations, indigenous peoples' groups, relevant industries, and local resource managers. Economists, architects, and land-use planners are being invited, so as to enhance the flow of ideas between professionals concerned with protected area management and those concerned with wider conservation concerns."

This altered focus and dramatically enlarged participation made the IVth Congress vastly different from its precursors. Whether the Congress lived up to these expectations and whether the altered focus was appropriate will be the subject of much debate and will not be definitively answered until a few years have elapsed and all of the congress products are available.

THE CONGRESS SETTING

The congress was to be held originally in Panama, to provide global balance and avoid excessive dominance from North America and Europe as well as to recognize the important role being played by Latin America in protected area management. But the pariah status of the Panamanian dictator, General Manuel Noriega, and the subsequent United States invasion of Panama necessitated a change.

The new choice was Caracas, capital of Venezuela, a South American country with a history of stability and the longest continuous democracy in South America. Venezuela had a tradition of peaceful political change since the last military regime was overthrown in 1958 and was viewed as a model democracy in South America. Five days before the congress was scheduled to open all of that changed when rebel troops launched an unsuccessful *coup d'état* against the government of President Carlos Andres Perez. The coup attempt was crushed by troops loyal to President Perez but only after tank assaults and heavy machine gun and mortar fire in Caracas particularly around the Presidential Palace.

President Perez officially opened the congress in his first public appearance since the coup attempt. He walked to the podium accompanied by the army, navy and air force chiefs while squadrons of the Presidential Guard sporting red berets and toting M16 rifles surrounded the conference centre and helicopter gunships hovered above. From observing the streets of Caracas during the congress, the military are certainly not an endangered species in Venezuela with groups of armed troops on every street corner, usually callow youths who did not display any marked reluctance about who or what they might shoot.

Overlooking the city of Caracas from Calvary Hill stands a statue of Cristobal Colon, or Christopher Columbus, who, half a millennium ago, triggered a dramatic change to the biota of Central and South America. The coincidence of the congress with the 500th anniversary of the Columbian encounter should have reinforced the importance of technology and economic systems in determining the prospects of natural areas, the role of social systems and indigenous peoples in the survival of protected areas and the ever increasing internationalization of both the threats and the hopes for survival of national parks.

The nexus between environment and development in providing a sustainable future has yet to be properly grasped in both the industrial nations and the less developed nations. The problems are well illustrated in Venezuela with its large oil resources, its disparities between rich and poor and the social and political strains resulting from the structural adjustment programmes implemented at the behest of international lending agencies. Perhaps not too much has changed since the Liberator Simon Bolivar declared in 1812 after Caracas was destroyed by earthquake: "If Nature opposes our designs, we shall fight against her, and make her obey." (Pendle 1969).

The congress was not without its lighter moments such as when the Australian born Professor Robert M. May, from Oxford University and Imperial College, London, much to his obvious chagrin, was introduced prior to presenting his paper as a famous Venezuelan movie actress and film director or when the Director of the United States National Parks Service, James M. Ridenour III, as a gesture to his Spanish speaking hosts, decided to deliver the beginning of his paper in Spanish, to the guffaws of the Spanish speaking delegates and the anguish of the congress translation service who gave up any attempt to translate his "Spanish" back into English.

THE OPENING AND PLENARY SESSIONS

The congress opening occurred in the highly charged atmosphere of the immediate aftermath of the coup attempt. Sir Sridath Ramphal, President of IUCN and former Secretary-General of the Commonwealth, opened the congress with a stirring speech in support of Venezuelan democracy. Sir Sridath's high international profile has assisted in strengthening the importance of IUCN in international political circles and focusing a high level of political interest in the congress. The remaining speakers at the opening ceremony demonstrated this higher political profile of national parks and protected areas with addresses by President Carlos Andres Perez of Venezuela, Federico Mayor, Director-General of UNESCO, William Mansfield, Deputy Executive Director of United Nations Environment Programme (UNEP), Gerado Budowski from the Worldwide Fund for Nature (WWF), Marc Dourojeanni from the InterAmerican Development Bank, Rafael Moreno from the Food and Agriculture Organisation (FAO) and James Ridenour, Director of the US National Parks Service. The significance of these speakers lay more in their presence at the congress as a demonstration of the perceived international political significance of protected areas rather than in the contents of their addresses.

There followed three plenary sessions of delivered papers under the following themes:

- Protected Areas in the 1990s: Issues and Responses
- Expanding Partnerships in Conservation
- The Contributions of Protected Areas to Sustaining Society: A Global Review.

Introducing the plenary session on "Protected Areas in the 1990s: Issues and Responses", Jeffrey McNeely from IUCN predicted that the challenges facing protected areas in the coming decade are far more likely to increase rather than decrease. He noted the major problems facing protected areas include:

- Weak national constituency
- Insecure and insufficient funding
- Conflicts with local people
- Conflicts with other government agencies
- Insufficient management.

He said that modern approaches to protected area management must seek to address these challenges.

Dr Martin Holdgate, Director-General of IUCN, considered that "... contemporary and predictable changes make it necessary for protected areas to be viewed in a quite new way, integrating them within these wider policies (viz. the principles in "Caring for the Earth") for holistic and sustainable management of both terrestrial and marine systems, and recognizing that they are likely themselves to be used in many ways for the benefit of the human communities around and within them. Human pressures on the environment make it totally unrealistic to assume that as much as 10% of the land area or coastal seas of many countries can be set aside as sacrosanct natural habitats subject to no human use or occupancy. The challenge is to find ways of preserving valued landscapes, ecosystems and biological diversity while deriving from them as positive a contribution as possible to the welfare of the people who live around them. The Congress must look in a fundamental and challenging fashion at what protected areas are for, how they fit within the wider context of landuse policy, and how the objectives for which they have been created can best be achieved in future."

Dr Norman Myers surveyed what it is that protected areas are protected from, and described the pressures gathering around protected areas particularly those relating to the interaction between different policy areas which are likely to exert the greatest pressures of all. He identified a simple equation to illustrate linkages of:

$$I = PAT$$

where I stands for the impacts, P for population growth, A for economic welfare, and T for the technology needed to produce the economic welfare. Myers considered that existing policy and institutional frameworks are poorly equipped to counter the problems of interactions between policy areas. Kenton Miller from the World Resources Institute proposed a framework for action by protected area institutions and managers to contribute more effectively to the conservation of biodiversity. For protected areas and their surrounding regions, Miller proposed six actions:

- Make biodiversity conservation an explicit goal of protected area management.
- Develop management practices that implement the goals of biodiversity conservation within each area and their surrounding regions.
- Develop the information and knowledge needed to manage biodiversity and develop its potential.
- Operate protected area management activities on an experimental basis.
- Expand the scope of planning and management to the regional scale.
- Participate in international programmes that serve to support biodiversity goals and management objectives.

Miller emphasized that protected areas have always been a central feature in strategies to conserve nature but ". . . the goals of biodiversity conservation will demand greater intensities of management, broader co-operative programmes with scientists and *ex situ* conservation facilities, and the integration of protected areas into regional management schemes."

Robert May from the Department of Zoology at the University of Oxford posed a cautionary warning on the use of ecological science in the management of protected areas when he said: "Whether we are trying to use natural enemies to control an insect pest, or drugs to control a disease, or ecological understanding to manage protected area, we are always dealing with a moving target which reacts to the changes we impose. . . . In short, the management of protected areas will in many cases involve weaving ecology together with social and economic considerations. Given the inherently dynamic and non linear character of the biological and other processes involved, it is often hard to foresee what the actual outcome of well-intentioned policies may be. These outcomes can be perversely contrary to the managers' intentions."

Dr Chandra P. Gurung, Director of the Annapurna Conservation Area Project in Nepal, noted that areas in the Third World had been designated as national parks, displacing local residents and prohibiting the use of resources within the parks. Such approaches have not met with many successes in Third World countries because of the different cultural, social, economic and natural environments; as a result various approaches have been evolved allowing local residents some benefits from protected areas. He said ". . . the real tragedy is that . . . resident peoples in developing countries have been displaced or deprived from traditional uses of park resources and left to suffer severe economic and social impacts without any documented proof that they were harming the resources of the park. . . . But many subsistence communities in and around the protected areas depend entirely upon the park resources for their daily needs. Hence, the debate should *not* be whether biodiversity be maintained at the cost of local residents or whether local people should be allowed to exploit the natural resources at the cost of biodiversity, rather it should demonstrate how biodiversity can be optimally maintained while fulfilling the needs of local people." He then examined the Annapurna Conservation Area Project as an example where nature conservation and human development are integrated.

The second plenary session dealt with the theme of "Expanding Partnerships in Conservation" which addressed the need to bring on board many other sectors of society not traditionally regarded as part of the conservation and protected area sector but which can make substantial contributions to the role of protected areas in sustaining society.

David A. Munro, the Director of the Caring for the Earth Project, addressed the issue of how to expand public support for protected areas. He noted that: "People support what they believe to be valuable, particularly if they consider it to be threatened or in short supply. People are usually more positive and active in their support if the values that they perceive accrue to themselves. . . . We can best approach the question of increasing the support for parks and protected areas by considering the nature of the benefits that they provide and the persons or groups to whom those benefits are provided. As a generality, this approach suggests that a goal of the managers of protected area systems should be to increase their actual values by maximizing the benefits and the numbers of people to whom those benefits can be provided — without causing ecological damage now or in the future and at lowest possible cost. It is further apparent that this goal should be sought by better management on the one hand and by raising public awareness of the values and benefits of protected areas on the other."

Gary E. Machlis, from the US National Parks Service and the Department of Forest Resources at the University of Idaho, said: "The criterion [*sic*] for useable knowledge related to protected area decision-making are specific:

1. The information must be provided at the proper point in the decision-making process. Timeliness is critical.
2. The information must directly address the manager's "need to know", and at a level of detail appropriate to the decision.
3. The manager must understand the limitations of the data, the degree to which it can be applied, the certainty (or lack thereof) of successful application, and the authoritativeness of the authors.

Hence a research project completed too late, dealing with issues of only tangential relevance to a manager's decision-making needs, presented without limits or explanation and by scientists of unknown credibility will not likely result in useable knowledge. Note that such research could be excellent, even brilliant science: it would still remain outside the boundaries of useable knowledge. A first principle for organizing an effective partnership can thus be stated: The social sciences must provide useable knowledge to protected area managers. . . . In many cases, managers may not be aware of or understand the potential advantage of using social science information. Often, protected area managers are uncomfortable integrating scientific information in their decision-making. Scientific advice often limits the range of decision alternatives available to the manager, by identifying any unacceptable consequences, prioritizing choices along scientific rather than political criteria, and creating the need for managers to defend their rationale for not following such delivered advice. Its potential is not being fully exploited. A second organizing principle for a full, effective partnership can thus be stated: Protected area managers must integrate the useable knowledge of social science into decision-making."

Machlis suggested that the most valuable contribution by social sciences to protected area management is in the feedback mechanisms for managers, in prediction based upon tested theory, in assessment of conditions prior to decision making and in the mitigation of impacts.

Other speakers in the second plenary were drawn from the media, forestry, energy, the arts, the military, women, hunters and business. However, given the aim of the session of expanding partnerships in conservation, it demonstrated that much needs to be done if the protected area sector is to establish meaningful partnerships with other sectors of society. One of the most interesting papers in this plenary was by Major-General E. D'Souza, Indian Army Retired, who argued that: "The Military have a unique non-violent and productive role to play in protecting the environment, creating security and patterns which are founded on co-operation and not on confrontation. The current political climate clearly points to redefinition of national security to include the use of the armed forces to protect and regenerate the environment."

The third plenary session was on the theme "The Contributions of Protected Areas to Sustaining Society: A Global Review." Dr Jim Thorsell, the IUCN Senior Adviser on Natural Heritage gave a detailed audit on the implementation of the Bali Action Plan, one of the products of the Third World Congress on National Parks. The Bali Action Plan listed 48 activities under 10 general activities. The 10 objectives of the Bali Action Plan were as follows:

Objective 1: To establish by 1992 a worldwide network of national parks and protected areas to cover 10% of all terrestrial ecological regions.

Objective 2: To incorporate marine, coastal and freshwater protected areas into the worldwide network.

Objective 3: To evaluate the ecological and management quality of existing protected areas.

Objective 4: To develop the full range of wildland management categories.

Objective 5: To promote the linkage between protected area management and sustainable development.

Objective 6: To develop the full capacity to manage protected areas.

Objective 7: To develop economic tools for supporting protected areas.

Objective 8: To implement an effective inventory and monitoring service.

Objective 9: To implement international cooperative mechanisms.

Objective 10: To develop and implement a global programme to support protected area management.

IUCN and its Commission on National Parks and Protected Areas (CNPPA) has made substantial progress in the objectives and activities of the Bali Action Plan.

Thorsell recognized that the target of a network of 10% coverage of all terrestrial ecological regions is well beyond current size and was not met. He noted that there are signs of a decline in the growth rate and a tendency for new areas to be smaller in size. He noted there is still a need for more application of scientific principles to protected area planning and management including the principles from the rapidly evolving field of conservation biology. He noted that the task of building in the human element in winning support for protected areas remains a priority task. Thorsell noted that "... our conceptual tools have been considerably developed in the past several years and there is a general agreement on how and where activities and actions need to take place. The gap is in applying these principles in real life situations and implementing the management measures that are waiting to be implemented. In other words, this means moving from "paper parks" to effectively managed protected areas that really do contribute to sustaining society. This implies the need for management plans for all protected areas and the buildup of a stronger and more qualified cadre of professional staff.... The challenge over the next three years is to apply these tools and policies and strengthen our commitment to put results on the ground."

There then followed 15 Regional Reviews presented to the Congress in draft form for discussion prior to their finalization and publication in a single volume. Each review described the protected area situation in the context of the region, presented an overview of national participation in international programmes and conservation conventions, presented a regional overview of the coverage of various habitat types, identified the priorities for additional areas, summarized the current financial investment in protected areas, presented an overview of human capacity in protected area management, identified protected areas under particular threat, and identified priorities for action and investment.

Thus the aims of the regional reviews were bold and far reaching. The draft regional reviews were of varied quality. The Australian Regional Review was prepared by Dr Peter Bridgewater and Gwennyth Shaughnessy from the Australian National Parks and Wildlife Service. This review curiously excluded the Great Barrier Reef Marine Park on the grounds that it is not a protected area in the sense used in the review. Under the heading of additional protected areas required, the review mentioned no specific proposal. Similarly, no specific proposals were identified under the heading of priorities for future investments in protected areas. The review identified six major protected areas issues in the Australian region:

- People in protected areas being the role of Aboriginal people in protected areas.
- Involvement by the private sector being the need to encourage the protection of biodiversity on private lands outside the boundaries of protected areas.
- Protected areas and surrounding lands being the subsuming of nature conservation agencies within larger public land management agencies.
- Protected areas and science being the conduct of scientific research to assist in the management of protected areas.
- Threats to effective management of protected areas being constraints of staff and finance on preparing and implementing plans of management and pressures from the mining industry to undertake mineral exploration in protected areas.
- Transfrontier initiatives such as the Australian Alps National Parks, the Ningaloo Marine Park in Western Australia and the Great Barrier Reef Marine Park.

So far as priorities for action in the region are concerned the review said: "In geographic terms the areas where effort is being focused are the arid areas, and the marine zone. Australia has significant areas of arid ecological systems, few of which are adequately protected. Similarly, Australia has the greatest areas of undisturbed mangrove systems in the World, which have extraordinary species diversity, even if the majesty of the forest is less than that of fully tropical areas. In the next decade, completion of ecological inventories, and greater uniformity of administrative approaches between Federal and second order jurisdictions, will combine to refine and improve the nation's protected areas. Australia, as a megadiverse country, has the potential to have the finest protected area system in the world. We have little doubt that the challenge will be met to achieve this target. The Fifth Congress will be the venue where we can be judged!" This assessment of future priorities so far as the Australian region is concerned was disappointingly vague and vacuous particularly when compared to other regional reviews.

To coincide with the Congress, IUCN published a four-volume publication entitled "Protected Areas of the World: A Review of National Systems" providing an invaluable factual compilation of the protected areas of each nation.

THE SYMPOSIA AND WORKSHOPS

After the first three plenary sessions, the congress proceeded with four parallel symposia. The symposia were designed to present the main themes, concepts and principles to be addressed at the subsequent workshops. The four symposia were as follows:

- How Protected Areas Can Meet Society's Needs: The Social, Economic, and Political Issues.
- Protected Areas in a Changing World: The Scientific Issues.
- Regional Planning and Protected Areas: The Development Issues.
- The Challenge Within: Strengthening Protected Area Management.

The symposia provided a foretaste of the diversity of issues to be considered by the 49 different workshops. In the face of proliferating issues and themes, a cautionary note was given by Associate Professor James R. Barborak of the University for Peace, Costa Rica: "One of my biggest concerns is that with all the talk about buffer zones, extractive reserves, sustainable development and the need to improve the lot of local people in regions surrounding parks and reserves, that all institutions involved in their management lose sight of their core mission, which in the case of strictly protected areas is to protect resources for the long term and produce a sustainable flow of wildland services for a nation. Out of a do-gooder urge, I am truly concerned that parks agencies are jumping on the sustainable development bandwagon and diverting scarce human and financial resources to tackle problems they can never hope to resolve. Many such problems are really the responsibility of other agencies, and this diversion of interest is occurring at a moment when most park agencies are suffering cutbacks or frozen budgets and staff levels in an era of growing responsibilities. What good is a buffer zone if the core is destroyed?"

Then followed the 49 workshops, 15 of which were underway at any one time. Large numbers of abstracts of papers had been submitted, each about 150 words. Workshop Chairs were given absolute power to determine the structure and format of sessions. As a result some workshops consisted of a procession of 10 to 15-minute delivered papers while in others the advertised papers were abandoned in favour of group discussion structured around particular themes and issues. The results were uneven and varied. Unless the authors of papers brought multiple copies of their written paper for distribution often the brief verbal presentation failed to fully communicate the arguments and reasoning. In numerous cases it was difficult to discern any analysis or lessons of broader applicability in presentations other than they comprised an interesting "this is my park" talk which was probably delivered for no other reason than the delivery of a paper was necessary to gain the support of a funding agency to enable attendance at the congress. The avalanche of papers without any apparent review or selection served to obscure many worthwhile contributions. Each workshop was required to prepare a report back to the relevant Symposia Chairs for presentation to the congress.

THE FINAL PLENARY SESSIONS

Following the often chaotic workshop sessions, the participants reconvened for four final plenary sessions. The first was a presentation entitled "Protected Areas in Latin America and the Caribbean" followed by a plenary on the theme "Moving Ahead to the 21st Century" in which the four Symposia Chairs sought to summarize the outcomes of the workshop sessions. This was an unenviable task given the volume of material and the limited time available.

The congress then received presentations on six large areas throughout the world in the plenary entitled "Putting the Pieces Together". The presentations were as follows:

- La Amistad/Talamanca Range (Costa Rica and Panama) by Conservation International and the Organisation of American States.
- The Great Barrier Reef (Australia) by the Great Barrier Reef Marine Park Authority.
- Serengeti-Ngorongoro-Masai Mara (Tanzania and Kenya) by IUCN.
- The Greater Yellowstone Ecosystem (USA) by the Greater Yellowstone Coalition.
- The Eastern Himalayas (Nepal and China) by Woodlands Institute.
- The Waddensee (Netherlands, Germany, Denmark) by the Waddensee Secretariat.

The final Closing Ceremony plenary discussed the Caracas Declaration and the Caracas Action Plan. The Congress finalized and adopted the Caracas Declaration which was handed by President Perez to Maurice Strong, Secretary-General of the United Nations Conference on Environment and Development. The finalization of the Caracas Action Plan was delegated to the Congress organizers to complete. The Caracas Declaration included a series of recommendations directed to all governments and appropriate national and international bodies. They were as follows:

1. To take urgent action to consolidate and enlarge national systems of well-managed protected areas with buffer zones and corridors, so that by the year 2000 they safeguard the full representative range of land, freshwater, coastal and marine ecosystems of each country and allow these ecosystems space to adapt to climate change.
2. To ensure that the environmental and economic benefits which protected areas provide are fully recognized in national development strategies and national accounting systems.
3. To support the development of national protected area policies which are sensitive to customs and traditions, safeguard the interests of indigenous people, take full account of the roles and interests of both men and women, and respect the interests of children of this and future generations.
4. To ensure that effective international, national, regional and local administrative, legal, accounting and financial mechanisms for supporting protected areas are established as a matter of priority and regularly review.
5. To allocate adequate financial and other resources so that, once designated, protected areas are managed effectively, to achieve their intended objectives.
6. To strengthen environmental education, and to provide training that will improve professionalism in the management of protected areas.
7. To facilitate the establishment of effective and efficient networks of NGOs co-operating at a local, national and international level to further national park and protected area objectives.
8. To recognize the significance of demographic change and its consequences for the survival of biological diversity and to take appropriate actions to reduce this threat.
9. To foster publically funded scientific research and monitoring that will improve the planning and management of protected areas, and to use such areas as sites for studies that will improve understanding of the environment.
10. To develop mechanisms that will allow all sectors of society, especially long-standing local populations, to be partners in the planning, establishment, and management of protected areas, and will ensure they share equitably in the associated costs and benefits.
11. To participate actively in global and regional conventions and other legal instruments, action programmes, and procedures to promote protected terrestrial, coastal and marine areas and the conservation of biological diversity.
12. To work energetically to safeguard the world's tropical forests, particularly those of Amazonia which are reservoirs of outstanding biological diversity and under severe pressure.
13. To strengthen international technical and financial co-operation that will assist developing countries to establish and manage protected areas and to safeguard biological diversity.
14. To co-operate to safeguard species, ecosystems and landscapes that extend across national borders and therefore require protection through the collaboration of neighbouring countries.

CONCLUSIONS

The Congress demonstrated the strengths and weaknesses of the national parks and protected areas movement. Its strengths are the vastly increased support and interest in protected areas demonstrated by the enthusiastic attendance of so many participants at Caracas and the professional skills and resources available demonstrated by the breadth and quality of presentations. Moreover the movement has acquired a global diversity with new and exciting initiatives from all continents and a great vitality in Latin America. Its weaknesses are a diminishing rate of success in implementing programmes into actions and a product of its diversity in that core goals and principles may be sidetracked by issues which, however worthy, are peripheral to the core role of the national parks and protected areas movement.

The publications which will emerge from IUCN in the next two years generated by the Caracas Congress will provide a cornucopia of ideas, information, guidelines and practical assistance which will provide a springboard for improving the world's national parks and protected areas.

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Bias and biodiversity

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It is well known that the greatest threat to biodiversity is due to the rapidly expanding human population with its insatiable appetite for the Earth's resources. The human plague and all its catastrophic side effects are perpetrating a major extinction event. And yet what efforts are being made to understand the real nature of the diversity that is being lost and the actual cost to us as living organisms? With around only 5.2 per cent of our planet's land protected (Groombridge 1992), and an estimated 140 species in the tropics alone becoming extinct every day (Ryan 1992), where do our priorities lie? Should we be more concerned about diminishing koala numbers, destruction of rainforests, threats to the Great Barrier Reef, or soil erosion?

Before attempting any such prioritization we should ask a basic question — what organisms play key roles in the fundamental processes in ecosystems? We may then be able to assess the kinds of losses that would cause the most serious impacts. Much of the conservation literature is dominated by work on vertebrates and higher plants. Whereas higher plants play an enormously important part in terrestrial ecosystems, in the marine sphere this is clearly not so. Vertebrates are usually conspicuous, for example fishes in marine ecosystems, and birds, reptiles and mammals in most terrestrial systems. But are they significantly involved in any of the processes that might be called "fundamental"? To answer this question we must go back to basic ecological principles.

The key to animal life is autotrophy — the conversion of inorganic substances into organic. The most essential autotrophic process, as we all know, is photosynthesis — in which living organisms are able to use the energy of sunlight to convert inorganic material (carbon dioxide), into organic material. It occurs not only in plants but also in many bacteria. Algae, higher plants and some bacteria produce oxygen as a byproduct. Another, but less well known, autotrophic process is chemosynthesis, the production of organic matter from inorganic by means of chemical energy, which is limited to certain groups of bacteria. Photosynthesis and chemosynthesis are an essential part of the cycling of elements and compounds upon which the entire biosphere depends.

Because as little as 1–15 per cent of plant material is actually harvested by animals (Whittaker 1975), the other side of the autotrophic coin is the vital necessity to decompose dead organic material to make it once again available to the autotrophs, otherwise all nutrients would be locked up in dead bodies. Bacterial and fungal activity is responsible for most decompostion, although some is nonbiotic (e.g., fire). Thus the popular notion that ecosystems can be understood with food chains starting with plants, followed by herbivores, and ending with carnivorous animals is excessively simplistic, ignoring the huge, necessary contribution by micro-organisms. In fact without their intestinal symbiont fauna and flora most metazoans would be unable to function. Other